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ABSTRACT

The first of two parts in this document is a student workbook which is designed to teach students how to construct a concept map, i.e., a graphic arrangement of the key concepts in a body of subject matter with connecting lines labelled to show valid and meaningful relationships between the chosen concepts. The workbook provides a discussion of concept maps and their purpose, examples of concept maps, and step-by-step instructions for constructing a concept map. The second part is a consultant/teacher guide, which also discusses concept maps and their purpose, and provides guidelines for the evaluation of student mapping exercises. Comment sheets and forms for recording the dates that mapping exercises are received from students and mailed back to them conclude the document. (DB)

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# CONCEPT MAPPING
## Student Workbook

Developed by

SOM NAIDU

As part of the research materials for the degree of Doctor of Philosophy (July 1990)

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**What is concept mapping?**

Concept mapping is identifying key concepts in a body of subject matter and arranging those concepts around a focal concept. It also involves linking the selected concepts by lines and labelling them to show meaningful relationships between and among the concepts.

**Why do concept mapping?**

Concepts depend upon their relationships with other concepts for meaning. A personal grasp of these relationships between and among concepts characterizes meaningful learning. Concept mapping, with its emphasis on linking concepts to other concepts, events and objects has been shown to be an effective means for enhancing meaningful learning.

Concept mapping skills, once acquired, can be useful in a variety of circumstances, such as in: a) reading and studying; b) planning an assignment, paper or report; c) organizing information on a presentation, and d) preparing for tests and/or examinations.

**What is a concept map?**

A concept map is a graphic arrangement of the key concepts in a body of subject matter with connecting lines labelled to show valid and meaningful relationships between the chosen concepts. Each concept map represents a personal expression of meaning in the selected material and as such, concept mapping is an idiosyncratic learning and working strategy which serves to satisfy a mapper's particular approach to understanding a body of selected material. Typically, a concept map comprises a number of selected key concepts, one of which is identified as the focal concept on the map. The selected concepts are linked by lines with arrows and labelled to stipulate meaningful relationships between them.

A focal concept is a concept that is of special interest to a mapper and is the focus of the particular map. On a page the focal concept can be placed at its center, on the sides, at the top or at the bottom. Usually, the focal concept is chosen from the most

general concepts in the selected material. However, the choice of a focal concept is a personal decision and a number of mappers of the same material are quite likely to differ in their choice of focal concepts. One person's focal concept may not be his/her, or another person's focal concept in another map of the same material. Figures 1, 2 and 3 which are reproduced from Novak & Gowin (1984, p. 16 and 18), illustrate this kind of shifts in focal concepts in three different maps of the same material.

Lines connecting the selected concepts on a map and labelled with valid and meaningful propositions reveal relationships between concepts. Propositions are two or more concepts linked by words to stipulate a meaningful relationship. For example, "snow is white" represents a simple concept map forming a valid proposition about the concepts "snow" and "white". Lines from one part of the map to another represent "cross links" and they reveal relationships between concepts in different parts of the map.

Figure 1. A map of the concept of water showing the focal concept "water" and related concepts.

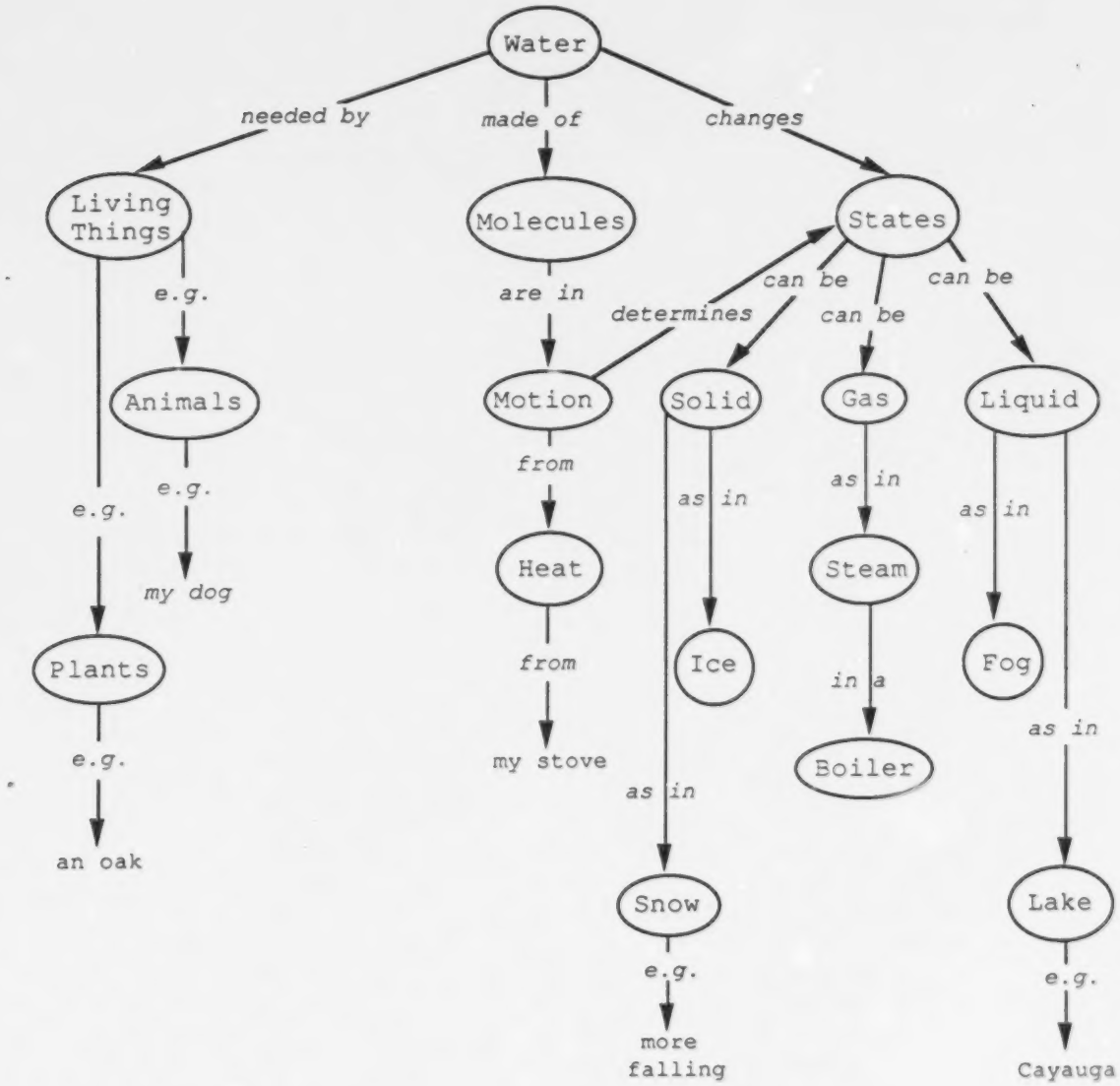


Figure 2. A partial map of the subject matter in Figure 1 with a different focal concept - "living things".

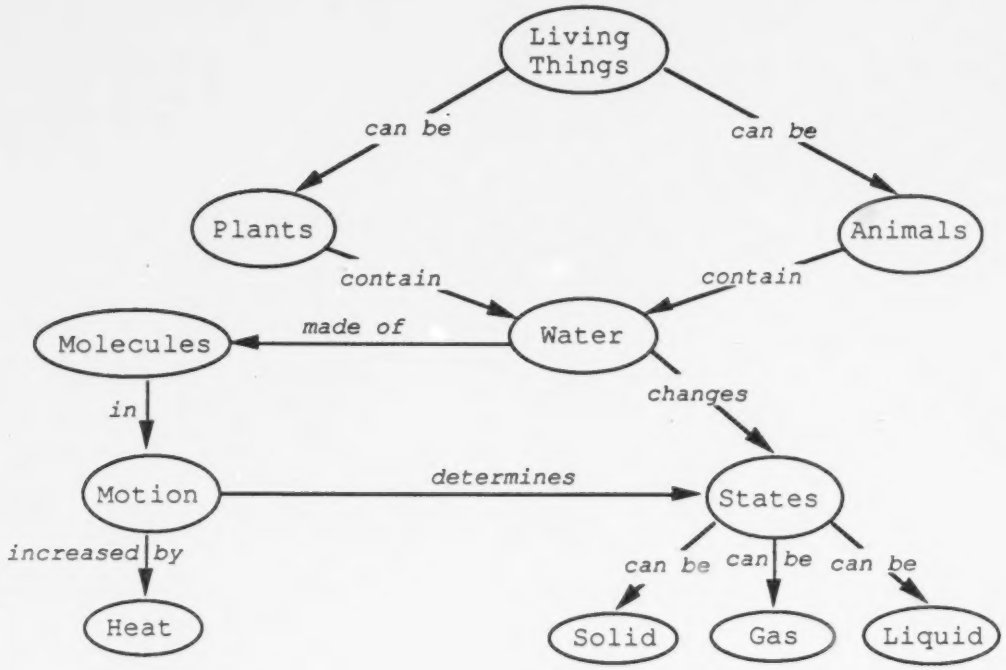
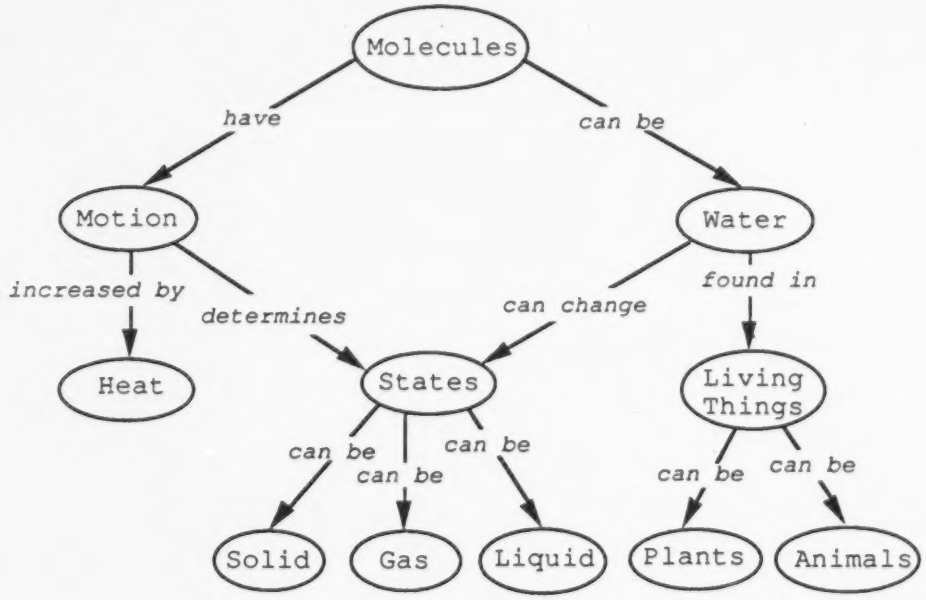



Figure 3. A partial map of the subject matter in Figure 1 with yet another focal concept – "molecules".



**How do you develop concept maps?**

Concept maps are developed by identifying key concepts, events, and objects in a body of subject matter and arranging these around a focal concept with connecting lines to show valid and meaningful relationships between and among them.

The "raw material" for the maps you are to develop will come from your study materials and these are specified in your *Study Guide*.

The procedure outlined in the following steps should be helpful to get started. I will use this procedure here to demonstrate its usefulness in the development of a concept map. Later on you will have an opportunity to develop your own map using the same procedure.

***Step 1: Identify*** the key concepts, events and objects in the material that is to be mapped. This requires a careful reading of the selected material and separating the key concepts, events and objects from the rest of the text.

For this example, I have selected a passage from Barry, P. D. (1989). *Psychosocial Nursing Assessment and Intervention: Care of the Physically Ill Person* (2nd ed.). Philadelphia: J. B. Lippincott Company. Only a part of the selected material is reproduced below. The remainder of the text, appears on pages 32-34 of Barry's book.

As I read through the material, I made a separate list of the key concepts I identified. You might find it easier to simply highlight them in your book.

A part of the material selected for mapping.

**A Theory of Personality Development**
**Maslow's: Hierarchy of Human Needs**

Abraham Maslow...believed that personality develops because of a person's need for satisfaction, happiness, and growth. Maslow believed that there are five levels of needs in human beings. He called his theory the hierarchy of human needs. The main view of his theory is that the first level of needs must be met before one can strive for the next level of needs, the second level must be met before one can strive for the third, and so on. The needs are organized according to their potency and primacy. The five needs are: 1) physiological needs; 2) safety needs; 3) love and belonging needs; 4) esteem needs; and 5) self-actualization need...

List of key concepts identified.

*Key concepts:*

- Maslow's hierarchy of human needs.
- Personality development – satisfaction, happiness, growth.
- Levels of human needs – potency, primacy.
- Psychological needs – food, shelter, sleep, sexual gratification, physiological equilibrium, lack of pain. Not met – death.
- Safety needs – predictable social, physical environment. If unfulfilled – emotional damage, fear.
- Love and belonging needs – family, friends, social acceptance, enduring intimacy. Essential for full social development.
- Esteem needs – self-worth, positive self-image, self-acceptance. For adults, competence, reputation, satisfaction, self-value.
- Self-actualization needs – development of full potential, motivates all human behavior.

***Step 2: Select*** a focal concept from the list of key concepts and ***cluster*** the concepts according to the extent to which they interrelate closely. There are no fixed rules for selecting a focal concept. It satisfies your need to find meaning in the material. The clusters or groupings of concepts you will come up with, will reflect your personal judgements about closeness of association among them. Discussion with friends and colleagues may help to clarify these judgements.

If your focal concept is the same as that of the author of the material, there will exist an order there which you might want to keep. My focal concept is the same as that of the author of the

material I have chosen to map, so I am retaining the order in which the key concepts are presented there.

Focal concept and clusters of related key concepts.

*Focal concept:*
Maslow's Hierarchy of Human Needs.

*Related concepts:*
Abstract Concepts:
- Personality development.
  * satisfaction.
  * happiness.
  * growth.
- Levels of human needs.
  * potency.
  * primacy.

Specific Concepts:
- Psychological needs.
  * food, shelter, sleep, sexual gratification, physiological equilibrium, lack of pain. Death.
- Safety needs.
  * predictable social, physical environment. Emotional damage, fear.
- Love and belonging needs.
  * family, friends, social acceptance, enduring intimacy.
- Esteem needs.
  * self-worth, positive self-image, self-acceptance. Competence, reputation, satisfaction, self-value.
- Self-actualization needs.
  * development of full potential, motivates human behavior.

***Step 3:*** ***Arrange*** and ***link*** the focal concept and clusters of related concepts with lines. Your arrangement of the concepts for mapping is meaningful to you and is based, in part, on the focal concept you have selected. The use of arrows will help draw out the focal concept from the related concepts and communicate your arrangement of the concepts more effectively. Wherever necessary, I have used arrows in my map (see Figure 4). The focal concept and clusters of related concepts may appear in any order on your page. Another person mapping the same subject matter may well have a different and valid arrangement that is meaningful to him or her.

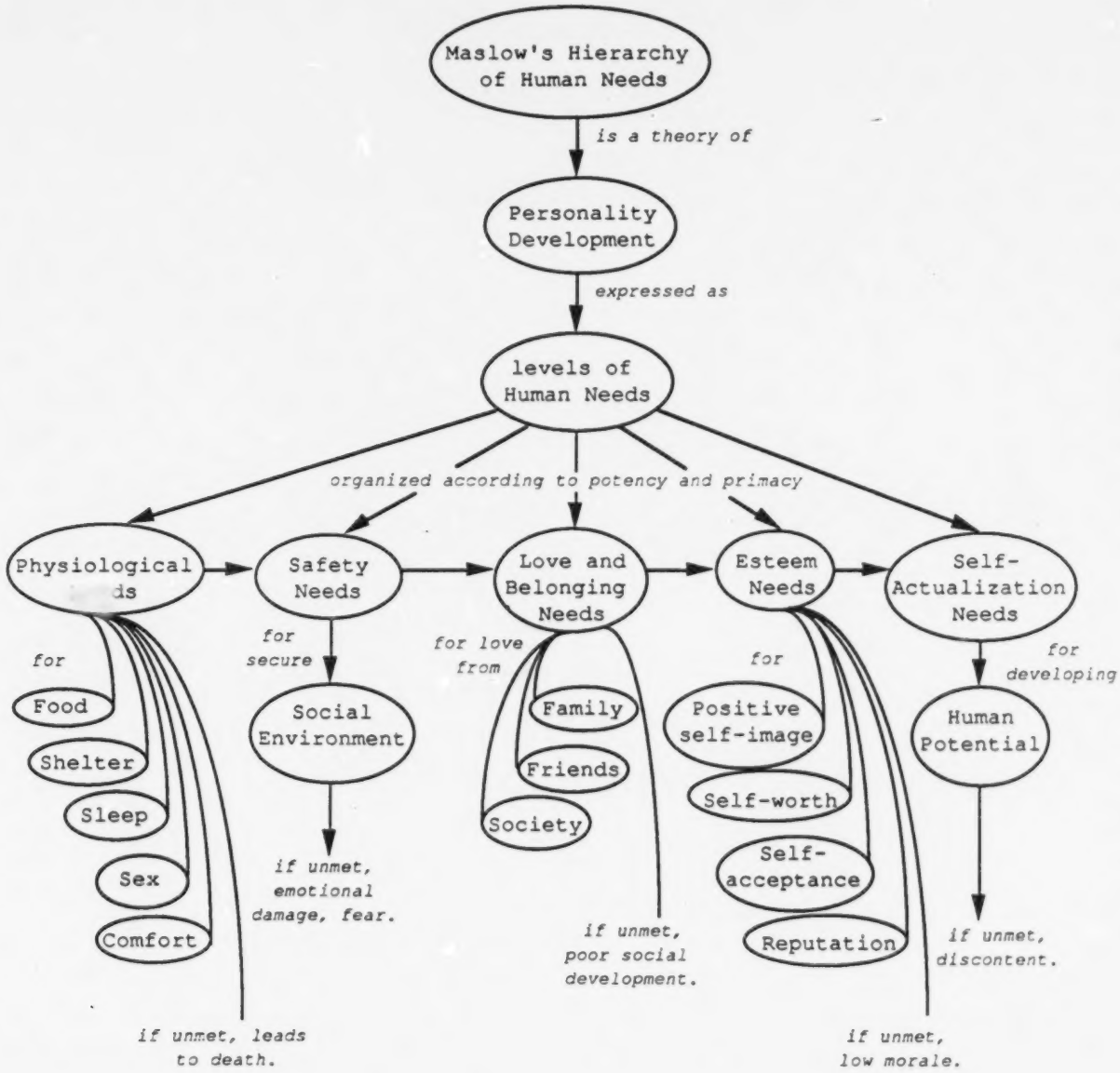
My arrangement in Figure 4 is obviously hierarchical, and is reflective of the nature of the selected material and choice of my

focal concept (i.e. Maslow's hierarchy of needs). However, this is by no means the only way I could have arranged the key concepts for mapping this material. I could have placed my focal concept on the side of the page, for instance, and still come up with a meaningful arrangement of the concepts.

Notice also that I have drawn ellipses around the concepts. Some of you might be inclined to use a variety of geometrical designs such as rectangles, circles and ellipses to separate the focal concept from related concepts and different clusters of concepts. Some of you may not like to use any form of geometrical designs at all, which may work just fine for you. I have chosen to use ellipses only, and their different sizes in this instance do not suggest anything special.

***Step 4: Label*** the connecting lines on your map to show valid and meaningful relationships between the concepts. Work with one pair of concepts at a time. Once linkages are labelled, your map should be readable in the direction of the arrows.

Figure 4. Key concepts arranged, linked and labelled.



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**A practice exercise**

For your subject matter, let us go back to *Chapter Three: Theories of Personality Development* in Barry, P. D. (1989). *Psychosocial Nursing Assessment and Intervention: Care of the Physically Ill Person* (2nd ed.). Philadelphia: J. B. Lippincott Company.

***Step 1: Identify*** the key concepts in the material that is to be mapped. Only a small portion of the material selected for mapping is reproduced below. For the remainder of the text, refer to pages 28-29 in Barry's book. Read it through carefully before going on to do this exercise.

A part of the material selected for mapping.

**Piaget: Cognitive Stages of Development**

Jean Piaget...studied the intellectual stages of children's development through clinical interviews, observations and experiments. He believed that there are four stages in the intellectual development of the child...

Piaget's theories are important to nurses for many reasons. All nurses work in a pediatric setting at some time during their professional education. When patient teaching is necessary, it is important to understand the intellectual stage of cognitive development in which the child is functioning. If a nurse is preparing to teach a 9-year-old-patient with diabetes, about his illness, it is essential to avoid abstract concepts and those concepts that involve a level of reasoning that a child can not perform...

Partial list of key concepts in the selected material.

*Key concepts:*

- Piaget's stages of cognitive development.
- Sensorimotor stage (up to 18 months).
- Infant learns through senses.
- Attentive to things seen, and heard.
- Touches objects and explores environment.
- Able to predict outcomes of actions.
- Tests these in play.

*Read through pages 28 and 29 in Barry's book and complete this list of key concepts.*

***Step 2: Select*** your focal concept and ***cluster*** the full list of key concepts you have come up with, as suggested below. Since your focal concept is the same as the author's, the related concepts are fairly obvious and already clustered. Let us stay with that order.

Focal concept and partial list of clusters of related concepts.

*Focal concept:*
- Piaget's stages of cognitive development.

*Related concepts:*
- Sensorimotor stage (up to 18 mths).
  - * Senses.
  - * Environment.
  - * Predicts and tests outcomes.

*Complete this list.*

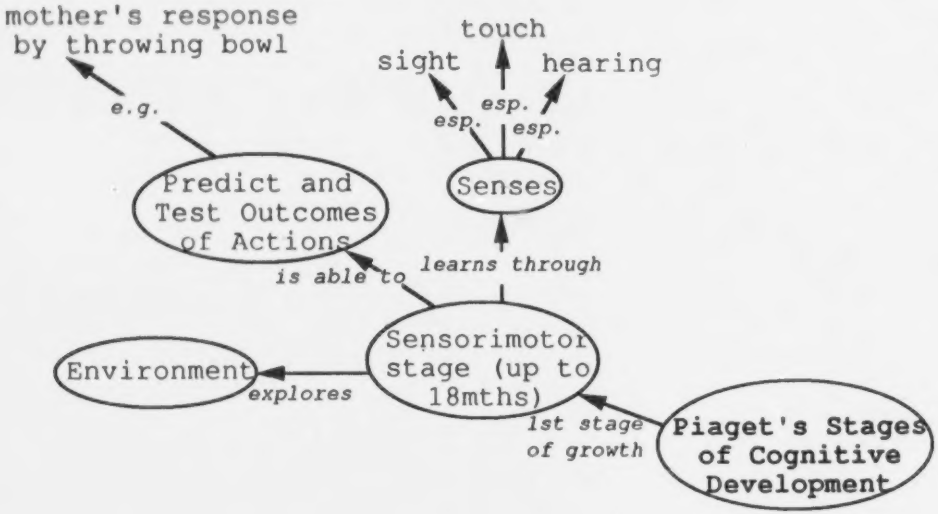
***Step 3:*** ***Arrange*** and ***link*** the focal concept and clusters of related concepts with lines. Use arrows to indicate the direction in which you wish your map to be read. I have made a start for you in Figure 5 on the following page. Continue with it and complete the map. Notice that this time I have placed the focal concept (Piaget's stages of cognitive development), at the center of the page because it made good sense to me.

***Step 4:*** ***Label*** the connecting lines on your map to show valid and meaningful relationships between the concepts.

Figure 5. Key concepts arranged, linked and labelled (next page).

**References**

Novak, J. D. & Gowin, D. B. (1984). *Learning how to learn*. New York: Cambridge University Press.


mother's response by throwing bowl
e.g.
touch
sight
hearing
esp.
esp.
esp.
Predict and Test Outcomes of Actions
Senses
is able to
learns through
Sensorimotor stage (up to 18mths)
Environment
explores
1st stage of growth
Piaget's Stages of Cognitive Development

# CONCEPT MAPPING
## Consultant's Guide

Developed by

SOM NAIDU

As part of the research materials for the degree of Doctor of Philosophy
(July 1990)

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**Introduction**

Your students will be doing a series of concept mapping exercises in this course. This guide outlines the procedures for concept mapping your students will follow, and your role in helping them develop the skill. It offers you guidelines for evaluating maps developed by students and includes forms at the end for keeping records of student progress.

In addition to this guide booklet, you should also have a copy of the *Student Workbook* on concept mapping, and it is advisable that you familiarize yourself with the contents of the workbook before looking through this booklet.

Our hope is that the knowledge that will be derived from your participation in this exercise with us, will help improve the delivery of our courses in the distance education mode.

**Concept mapping**

Concept mapping is the graphic arrangement of key concepts in a body of subject matter with connecting lines labelled to show valid and meaningful relationships between the chosen concepts. The mapping exercises your students will do in this course are specified at the end of selected lessons in the students *Study Guide*. The subject matter for mapping is drawn from the course materials provided.

**Procedures**

A self-instructional workbook on developing concept maps has been prepared for the students. The maps your students are to develop and submit to you will not be graded, only anecdotal feedback on them will be provided. In order to help you evaluate student developed maps and provide feedback on them, we have sent you completed maps for each of the exercises.

Instructions to students, regarding the development of these concept maps and their submission to you regularly in order to receive feedback, are given in their *Study Guide*. The procedure is as follows:

- For selected lessons in this course, students have been presented with concept mapping exercises. These exercises appear at the end of the selected lessons in the students *Study Guide*.

- Students are to do these mapping exercises immediately after completing study of the lesson material and submit the maps to you for evaluation and feedback.

- Please note the date the mapping exercises are received from the students on the record sheets at the end of this booklet.

- Evaluate the submitted maps, according to guidelines provided in this booklet. You are not required to give students a mark or grade on these mapping exercises. Give them generalized feedback on the adequacies/inadequacies, strengths/weaknesses and completeness/incompleteness of their maps, for instance, regarding the identification of the key concepts and the specification of valid relationships between the key concepts.

- Return them their mapping exercises along with a copy of the map developed by the course professor for that exercise. You have been sent these under separate cover and they should serve as incentives to students for putting in their effort first.

- Note your mailing date on the record sheets at the end of this booklet.

- Be sure to impress upon the students that the sample map you have sent them is **not** necessarily the "correct" map, but a more complete map of the subject matter, and one that they could use to examine their own effort against.

- Students may move on to the study of the next lesson or module without waiting for feedback on completed mapping exercises.

- Please be sure to make a photocopy of all student developed maps with your comments on them for the course professor. Send these in to her regularly. Do not wait for maps to accumulate before sending them in.

**Guidelines for evaluating maps**

Concept maps are graphical representations of the key concepts, and the relationships among them in a selected body of subject matter. For assessing student learning and providing them with feedback, concept maps are best applied as a qualitative tool and not intended to lead to a score.

We suggest you use the following guidelines for evaluating student mapping exercises and providing them with feedback. See Figure 1 for an illustration of these features in concept mapping as you read through.

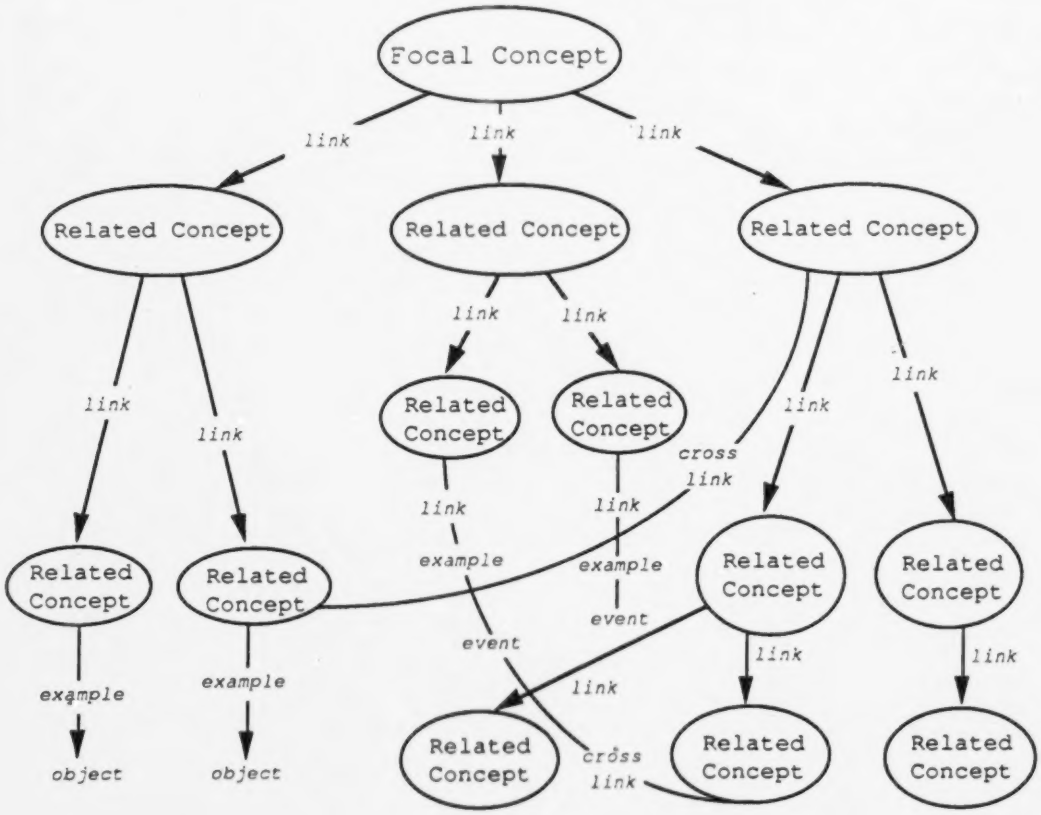
*Key concepts:* Look for the focal and related concepts? Have they been identified clearly?

*Relationships:* Look for lines between these concepts, and arrows to indicate the nature of the relationships. The specific relationships should be indicated on these lines. Are the relationships indicated valid?

*Cross links:* Cross links reveal relationships between concepts on one section of the map with concepts on another section. Are there cross links indicated on the map? Do they show valid and meaningful relationships?

*Examples:* These are specific events, objects and valid instances of the key concepts represented on the map. Are these appropriately indicated?

Figure 1. Features of concept maps.




(Adapted from Novak & Gowin (1984, p. 37).

**Keeping records**

It is important that you keep complete records of individual student progress with these exercises on the forms provided at the end of this booklet. Please tear off and send these forms in to the course professor, Sister Loretta Gillis at mid-term and at the end of the course.

**References**

Novak, J. D. & Gowin, D. B. (1984). *Learning how to learn.* New York: Cambridge University Press.

**Comments**: In the space below please make comments about any aspect of this exercise you found particularly *interesting* or *difficult*, and also how your students coped with it.

| RECORD OF STUDENT MAPPING EXERCISES | | | | | | |
|---|---|---|---|---|---|---|
| **Student Name** | **Exercise 1** | | **Exercise 2** | | **Exercise 3** | |
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| **Student Name** | **Exercise 4** | | **Exercise 5** | | **Exercise 6** | |
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| **Student Name** | **Exercise 7** | | **Exercise 8** | | **Exercise 9** | |
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| **Student Name** | **Exercise 10** | | **Exercise 11** | | **Exercise 12** | |
| | Date Received | Date Returned | Date Received | Date Returned | Date Received | Date Returned |
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